Applicants submit that Sudo et al do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of this rejection.

In the present invention, there is a dispersing of a graphite crystalline texture and an amorphous texture from the surface to the core of a particle, wherein the particle has a substantially uniform structure as a whole, whereas in Sudo et al, the structure becomes different on the surface and at the core of the particle because the surface of the particle has an amorphous-rich structure, the core has a graphite-rich structure and the particle as a whole has a nonuniform structure. Applicants note that in Sudo et al, resin is deposited onto a natural graphite particle, whereas in the present invention, a non-polymerized organic compound is impregnated and then is subsequently polymerized.

With respect to the phrase "a graphite crystal structure region and an amorphous structure region are distributed throughout the entirety of a particle constituting the carbon material from the surface of the particle to a center portion thereof" the Examiner sets forth the following argument as to why Sudo et al satisfy this recitation:

> Examiner's note: The examiner takes the position that "a graphite crystal structure region and an amorphous structure region are distributed throughout the entirety of a particle constituting the carbon material from the surface of the particle to a center portion thereof" is an inherent characteristic of the Sudo carbon powder because Sudo teaches the same carbonaceous particles and polymer that are formed by a deposition process that inherently impregnates the carbonaceous particle from the surface to the center portion. The examiner contends that the process of stirring a solution of natural graphite particles and varnish A (raw materials of a polymer) for 30 minutes in a planetary mixer is sufficient to impregnate the graphite particles from the surface to the center portion with the polymer (See Example 1). Burden is on the applicant to show differences in product comparison.

Applicants submit that Sudo et al provide a non-uniform structure, whereas the present invention provides a substantially uniform structure.

In particular, applicants assume the following three cases (i) to (iii) regarding the structure of the carbon powder particles as shown in the attached Figures 1 to 3, when carbonaceous particles and resin such as phenol resin are mixed followed by thermal treatment:

(i) When a thin coating of resin is put on the core particle, the resin and the core particle tend to have a similar structure;

(ii) when a thick coating of resin is put on the core particle, the coating and the core particle tend to have a different structure from each other; and

(iii) when resin penetrates through cracks of the core particle, the resin will have a similar structure with the core particle when the cracks are as wide as the thickness of the resin coating in (i) above.

Sudo et al fail to teach particular core particles and teach that resin is deposited onto natural graphite particles. Phenol resin normally is not a graphitizable raw material. Therefore, the carbon derived from phenol resin in Sudo et al is amorphous carbon, even after it is heated at a high temperature. This means that the surface having a large amount of the resin in Sudo et al becomes amorphous-rich carbon. Accordingly, the crystallinity in Sudo et al becomes non-uniform on the surface and at the core of the obtained particles.

On the other hand, the present invention teaches the core particles, and an unpolymerized organic compound permeates through the core particles and then the organic compound is polymerized inside the particles and graphitized. This allows the obtained particle to have a substantially uniform structure in which a crystal structure region and an amorphous structure region are almost homogeneously distributed.

The reason for the above is assumed as indicated in the attached figure. That is, resin such as phenol resin will not be graphitized normally by heat treatment. However, when a very thin coating of the resin is closely attached to crystalline carbon and the crystalline carbon are made into graphite crystals by heating, the adjacent phenol resin tends to be simultaneously graphitized. This provides an almost uniform structure of the present invention.

The Examiner states that Sudo et al teach the carbonaceous particles and polymers that are formed by a deposition process that inherently impregnates the carbonaceous particles from the surface to the center portion since the Examples of the present invention are similar to those of Sudo et al. However, the core particles are different in the two inventions. The present invention uses carbon in which resin is ready to permeate. The core particle in Comparative Example 1 of the present invention is equivalent to that in Example 1 of Sudo, and the core particle in Comparative Example 1 and Sudo et al cannot provide the uniform structure as defined in present claim 1.

In view of the above, applicants submit that Sudo et al do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of this rejection.

The Examiner sets forth five rejections of the claims based on Yamada (JP 10-116605) as a primary reference.

Each of these five rejections are substantially similar to the Examiner's previous rejections based Yamada and the various secondary references, except that the Examiner relies on Nakai et al as a secondary reference in a manner different from his previous reliance on Nakai et al. Applicants previously overcame the rejections based on Yamada by arguing that Yamada does not disclose or suggest an average particle size of 10 to 40 μm. The Examiner now relies on the Nakai et al patent as follows:

However, Yamada does not expressly teach carbonaceous particles that have an average particle size of 10 to 40 µm; carbon fiber having a filament diameter of 2 to 1,000 nm, wherein the carbon fiber is vapor grown fiber that each has an aspect ratio of 10 to 15,000. The Nakai reference discloses a negative electrode of a lithium ion secondary battery comprising vapor grown carbon fiber that has a filament diameter of 200 nm and a fiber length (particle size) of 15 µm (15,000 nm), which corresponds to an aspect ratio of 75. (See column 4, lines 1-9 and Example 6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Yamada negative electrode material to include carbonaceous particles that have an average particle size of 10 to 40 µm; carbon fiber having a filament diameter of 2 to 1,000 nm, wherein the carbon fiber is vapor grown fiber that each has an aspect ratio of 10 to 15,000 in order to utilize carbon fiber particles that improve the cycle characteristics of the battery while having high capacity and high power. In addition, there is no evidence of the criticality of the claimed range of the average particle size of the carbonaceous particles.

Applicants submit that Yamada and Nakai et al do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of these rejections.

Applicants first note that with respect to carbonaceous particles that have an average particle size of 10 to 40 µm, the Examiner does not contend that Nakai et al disclose such particles. The Examiner merely states that "there is no evidence of the criticality of the claimed range of the average particle size of the carbonaceous particles." However, applicants do not have to establish criticality when there is no teaching in Yamada of Nakai et al of the use of such an average particle size. The Examiner must first set forth a reason for obviousness of such a particle size before applicants need to establish criticality.

The Examiner does refer to the fiber length of Nakai et al as being a particle size, and states that Nakai et al disclose a "fiber length (particle size) of 15 µm (15,000 nm)." Applicants

assume that the Examiner is not relying on this disclosure for a teaching of carbonaceous particles that have an average particle size of 10 to 40 μm.

Further, applicants submit that Yamada teaches away from the present invention.

In particular, Yamada teaches in paragraph [0036] that the negative electrode material of Yamada has a two-layer structure in which the surface of carbon fiber is coated with the carbon derived from thermosetting resin, and teaches in paragraph [0020] that the effects of the invention are achieved by the interaction of the carbon fiber and the carbon coated on the surface in the two-layer structure. That is, the two-layer structure in Yamada is a prerequisite for the negative electrode material of Yamada, which teaches away from the present invention comprising a substantially uniform structure as an essential requirement.

In view of the above, applicants submit that Yamada and Nakai et al do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of each of the five rejections based on Yamada.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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Fig. 1

When a thin resin coating is deposited, the resin tends to have a similar structure after thermal treatment.

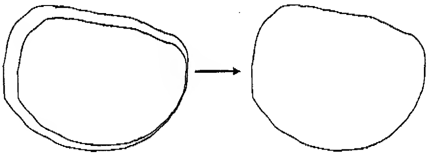

Fig.2

When a thick resin coating is deposited, a carbon layer derived from the coating resin tends to have a different structure with the core particle after thermal treatment.

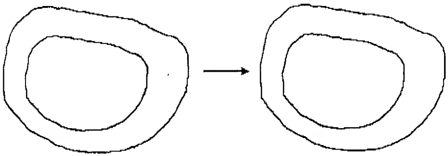

Fig.3

When a thin resin coating permeates through cracks of the core particle and the cracks are small in width, the coating tends to have a similar structure with the core particle after thermal treatment.